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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,616	03/23/2004	Stephen A. Empedocles	IVGN 618.4 CON	4043
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EXAMINER HESS, DANIEL A				
ART UNIT		PAPER NUMBER		
2876				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/807,616

Applicant(s)

EMPEDOCLES ET AL.

Examiner

DANIEL A. HESS

Art Unit

2876

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

This action is responsive to applicant's 6/20/2008 amendment and arguments.

Response to Arguments

Applicant's arguments filed 6/20/2008 have been fully considered but they are not persuasive.

The examiner appreciates the careful arguments by the applicant.

The applicant makes much of the limitation 'selecting a plurality of acceptably distinguishable labels from among the candidate labels.'

The examiner notes that Bawendi describes (see abstract)

"a "barcode" comprising one **or more sizes** of semiconductor nanocrystals (quantum dots) having characteristic spectral emissions"

Indeed there are no less than 24 references to "one or more sizes" of particles, each size having a particular spectral emission pattern. The very existence of multiple sizes in one code is prima facie evidence of selecting a plurality of acceptably distinguishable labels. Bawendi has no trouble using multiple sizes together (see for example column 9, lines 14-41).

The applicant has not convinced the examiner that there is any difficulty in distinguishing among multiple labels. If each is marked by one or more particular peaks, then the existence of both sets of peaks points to the existence of both markers.

It is no doubt a technical challenge to create these nanoparticle labels, but to decide that two of these labels are 'distinguishable' is trivially easy. Do they have separate spectrographic peaks? Spectrographic measurements will show this right away.

As for the applicant's arguments about modeling, the simple fact of additive emission behavior for nearby dots and additive intensity for individual dots is all Bawendi needs to choose which quantum dots to use, and these simple additions are a rudimentary model. The applicant has not claimed any specifics regarding the modeling. If Bawendi determines that one dot emits at f_1 and another emits at f_2 and f_1 is different from f_2 , then the simple model one may construct for the combination consists of two peaks at f_1 and f_2 . Bawendi would not have to actually run a test to know this. This additive is simply a physical property of electromagnetic radiation.

Regarding claim 7, Bawendi manufactures first (undoubtedly with an approximate expected outcome for a process that is roughly repeatable) and then measures.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Bawendi et al.
(US 6,617,583).

Re claims 1 and 2:

Bawendi's invention is very much like the Instant Invention.

See column 3, lines 16-30 of Bawendi:

"In particular, the present invention utilizes a "barcode" comprising **one or more** particle size distributions of **semiconductor nanocrystals** (quantum dots) having characteristic spectral emissions to either "track" the location of a particular item of interest or to **identify a particular item of interest**. The semiconductor nanocrystals used in the inventive "barcoding" scheme can be tuned to a desired wavelength to produce **a characteristic spectral emission** by changing the **composition and size of the quantum dot**. Additionally, the intensity of the emission at a particular characteristic wavelength can also be varied, thus enabling the use of binary or higher order encoding schemes. The information encoded by the quantum dot can be spectroscopically decoded, thus providing the location and/or identity of the particular item or component of interest."

Here the basic concept of Bawendi shown. Like in the Instant Invention, Bawendi achieves labeling by using quantum dots, and may use multiple dots to label a particular item. Figures 1 and 2 is also noteworthy, showing a plurality of different arrangements of quantum dot.

As for developing a set of labels (selecting a set of compounds) by selecting from a set (library) of candidate markers using observation as recited in the claims, Bawendi discusses this with clearly and explicitly at column 4, lines 16+:

“In another aspect, the present invention provides methods for identifying a compound having a particular characteristic of interest comprising providing a library of compounds, testing said library of compounds for a particular characteristic of interest, observing the photoluminescence spectrum for each identifier attached to each support containing a compound of interest, and identifying the compound of interest by determining the reaction sequence as encoded by said one or more sizes of quantum dots.”

Re claims 3 and 4: See column 3, lines 35-40. Here it is made clear that the quantum dots (a.k.a. semiconductor nanocrystals) are subjected to an excitation energy. It is also made clear that multiple quantum dots may be used.

Characteristic wavelengths and intensities result from the excitation energy (column 3, lines 20-25); these are measured.

Re claim 5: See column 4, lines 16+. There properties of different quantum dot combinations are measured/observed systematically.

As for modeling, Bawendi does not appear to attempt to predict the properties of individual dots. He does, however do what can be considered simple modeling. For instance, he knows (column 9, lines 10-41) that the number of quantum dots is proportional to the resulting intensity. He also knows that if two materials (dots) are near each other (but still discrete, not together as a compound) the resulting spectrum will be an additive combination of the two.

Re claim 6: As for manufacturability, this is understood throughout. In column 6, line 2, for example, Bawendi uses the language, 'can be readily made.' At column 7, line 57 to column 8, line 30, a specific process for manufacturing quantum dots is discussed.

As for modeling, see the discussion re claim, above.

Re claim 7: Clearly, even with knowledge of the intensity of a single quantum dot, the most accurate determination of the intensity of a group of dots would come from direct measurement, due to effects such as the blinking effect (column 9, lines 20-30). The fact that sufficient intensity is ultimately measured from observation is made clear at column 9, lines 30-35.

Re claim 8: All throughout Bawendi, it has been clear that quantum dots are measured after being energized. Without the stimulus, the quantum dots of course do not emit.

Re claim 9: It has been made clear at column 4, lines 16+ and elsewhere that Bawendi builds a library of markers by testing a range of substances and compounds.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(e) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi as applied to claim 1 above.

As has been discussed, Bawendi has in certain embodiments multiple different quantum dots, each of which has its own spectral response. As such, there can be expected to be at least two different spectral peaks corresponding to the different spectral dots.

Further, Bawendi teaches (column 5, lines 59-67),

“Upon exposure to a primary light source, each quantum dot distribution is capable of emitting energy in narrow spectral widths, as narrow as 25-30 nm, and with a symmetric, nearly Gaussian line shape, thus providing an easy way to identify a particular quantum dot. As one of ordinary skill in the art will realize, the linewidths are dependent on the size heterogeneity of the quantum dots in each preparation. Single quantum dot complexes have been observed to have **full width half max** as narrow as 12-15 nm.”

A Gaussian shape of course means that each quantum dot has a peak. As for spacing, Bawendi does not explicitly say that the spacing is greater than the FWHM, but it is quite obvious that it should be, for if it not, two lines will blend together and will not be clearly distinguishable. Clearly Bawendi the point Bawendi makes in referring to the FWHM is the possibility of allowing high information density (i.e. lines that can be close to each other), because of narrow FWHM values (see all of column 6, where Bawendi dicusses this).

Re claims 12 and 13: Without giving any the purpose of a 'reference marker' the claims are broad. Any marker or quantum dot can be considered a reference marker in Barwendi; all of these Q-dots are used for marking items.

Allowable Subject Matter

Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach or fairly suggest, in the context of the other limitations, an arrangement where each label has a reference marker that generates a reference signal which is used for calibrating the spectrum for the label.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL A. HESS whose telephone number is (571)272-2392. The examiner can normally be reached on 8:00 AM - 5:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Lee can be reached on (571) 272-2398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel A Hess/
Primary Examiner, Art Unit 2876
9/22/2008